REMARKS

The Specification has been objected to because of certain informalities. These informalities are corrected with the above amendments.

Claims 1-3 and 6-37 have been rejected under 35 USC 102(b) as being anticipated by Koizumi '892.

Of the claims under rejection, claims 1, 11, 20, and 31 are independent. Although the various claims are directed to, respectively, a chip, an apparatus having a chip, a wafer (from which chips can subsequently be diced), and a method of making a chip, at least one essential feature is common to all of the independent claims: the chip, however made, includes a portion of a **groove** which defines an ***edge*** of the chip. A light-transmissive planar layer extends **over** this groove, or in effect over the edge of the chip.

An embodiment of this claimed feature is shown in the specification as filed at Figure 3 for a chip which has not yet been diced from a wafer. Each chip 10 defines an edge having a portion of a groove 70. Although the side of the groove 70 slants downward from the main (top) surface of a chip 10, because the planar layer 72 extends over the portion of the groove 70, the overall top surface of the resulting chip 10, such as shown as the material to the right of cut line 71, is made planar even over the groove 70.

The practical advantage provided by this chip and wafer configuration is given at pages 2 and 8 of the specification as filed (emphases added):

> One problem concerns the inadvertent ripping or other damage to the cured filter layers when the wafer is diced into individual chips: **the relatively thin translucent filter layer**, particularly at the photosensors toward either end of the chip, **can be torn by the action of a saw blade.**
> * * *
> [With the present invention, w]hen a wafer is diced, such as along a groove 70, [because of] the fact that each filter layer 74 is disposed over and supported by clear [planar] layer 72, which itself takes up most of

> the void formed by th groov 70, **th filter layer 74 exhibits very little damage or tearing**, especially in the portions thereof around any photosites 14.

In short, by planarizing the wafer surface even up to a relatively deep groove which defines the edge of a chip, damage to a filter layer during a dicing process is avoided. Significantly, in the language of each pending independent claim, the light-transmissive layer *extends over the groove portion*: as shown in Figure 3 as filed, if a chip is cut through line 71, a portion of the transparent layer 72 which remains as part of the chip (i.e. the portion to the right of line 71) clearly extends over the groove 70, which defines the edge of the chip. The fact some of the transparent layer 72 *remains in the groove 70*, even at the time of dicing the chips from the wafer, prevents damage to other light-transmissive layers associated with the chip.

Turning to the cited art, Koizumi indeed discloses the use of transparent "resist" for "planarizing grooves in scribe regions" (i.e., chip boundaries) in a wafer having other color filter layers as well. The series of steps shown in Figure 11, as noted by the Examiner, generally correspond to the claimed structures and methods. However, close examination of the method and its resulting product show key differences between the reference and the claims, as noted at Column 2, lines 56-67 of Koizumi (emphasis added):

> In order to eliminate steps on the device surface, the entire surface of the device is coated with a transparent resist [FIG. 11C]. Then, coating and patterning for red (96), blue (98), and green (99) color filters are sequentially repeated, thus forming color filters [FIG. 11D]. Furthermore, in order to protect the respective filters, a passivation layer is formed on the entire surfaces of the respective color filters [FIG. 11E]. **Finally, a transparent resin in each scribe region is removed** [FIG. 11F]. **Thereafter,** respective solid-state image pickup **chips are cut along the scribe regions** using, e.g., a dicing cutter.

It is clear from this description that, prior to dicing the wafer into chips, the scribe line/groove portion of the wafer, such as shown as C, is indeed planarized

with transparent resist; however, as is perfectly clear by the above passage and Figure 11F of Koizumi, immediately before the dicing step, the transparent resist, or the light-transmissive layer, is *completely removed* from the groove C. Therefore, **no part** of the light-transmissive layer can be said to *extend into the area* corresponding to groove C in either the wafer or the finished chip, as recited in every independent claim.

Independent **claims 1 and 11** both positively recite that the light-transmissive planar layer extends over the groove portion at the edge of the chip, a structure that would clearly be impossible to achieve with the wafer as shown in Figure 11F of Koizumi. Independent **claim 20**, directed to a wafer, has been amended to recite positively that the wafer as claimed is suitable for immediate dicing into at least one chip. In other words, according to the claimed invention, the light-transmissive layer in the groove *remains in the groove* up to the point of dicing; this is in clear distinction from Koizumi, wherein the transparent resist is clearly taught to be *removed* from scribe line/groove C prior to dicing. Independent **claim 30**, directed to a method, has been amended to recite that the wafer is diced into at least one chip, the chip having a groove portion at an edge thereof, and wherein the light-transmissive planar layer extends into the groove portion of the chip. This claim is therefore distinguished over Koizumi for the reasons given for claims 1 and 11 above. Each remaining dependent claim in the rejection is deemed allowable as being dependent from one or another independent claim.

Claims 3, 13, 25 and 36 are rejected under 35 USC 103 over Koizumi, as applied to their respective independent claims, and further in view of Jedlicka, which discloses the use of acrylic for a filter layer. These claims are deemed allowable as being dependent upon their respective independent claims, the patentability has been argued above.

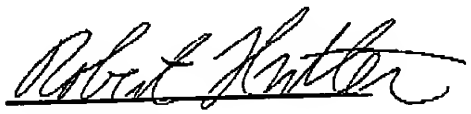
In summary:

Claim language: each independent claim recites that a light-transmissive layer **extends over the groove portion** defining each chip area, as shown as the clear material 72 to the right of cut line 71, extending over a portion of groove 70, such as in Figure 3 as filed.

Koizumi: Figure 11F shows how transparent resist in groove C is **completely removed from the scribe line/groove** before the dicing step; therefore, the transparent resist can in no way be said to "extend over the groove portion."

It is respectfully submitted that the present set of claims are patentably distinct over the cited reference. In the event the Examiner considers personal contact advantageous to the disposition of this case, he is hereby requested to call the undersigned attorney at (585) 423-3811, Rochester, NY.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE:

IN THE SPECIFICATION:

Amended paragraph on page 3, line 21:

U.S. Patent 6,157,019 discloses a configuration of photosensitive chips in which photosites immediately adjacent to a functional edge of the chip are shielded and thus defined with an opaque layer that overlaps the diced region and preserves the integrity of the filter layers while eliminating the need for a guard ring.

Amended paragraph on page 7, line 28:

Figure 4 is a plan view showing the configuration of various types of filtering layers 74 over a chip 10 and an adjacent chip 10' within a wafer. In this particular embodiment, there is provided a relatively short "scribe area" 75 of otherwise unused wafer area between chips 10 and 10', and successive blade cuts are used to cut through the respective grooves 70 and 70', as described, for example, in U.S. Patent 5,219,796. As shown, in this view there are provided three distinct filtering layers, indicated as 74A, 74B, and 74C, which respectively cover rows of photosites 14 described above as 16A, 16B, and 16C. Typically, the three types of filters 74 will each transmit only one primary color, red, green, or blue, so that the chip 10 itself can output image data reflective of the entire visible spectrum, as is familiar in the art. Significantly, as shown in [the Figure] Figure 4, the respective areas covered by filters 74A, 74B, and 74C each extend over one linear array, i.e., [row 16] rows 16A, 16B, and 16C of photosites 14; and the same filter area such as 74A for one chip 10 extends across the groove 70, scribe area 75, another groove 70', and over the equivalent row such as 16A for the adjacent chip 10'. Indeed, if there are a number of chips 10 in a row along one dimension in a wafer, each filtered area should extend across th suitable

row 16 of photosites for as many chips 10 as is geometrically possible. Once again, where a filter 74 extends over a groove 70, the filter 74 is disposed over and supported by a clear layer 72 (as shown in Figure 3) which presents a substantially planar surface over the groove 70.

IN THE CLAIMS:

20. (Amended) An integrated circuit wafer suitable for immediate dicing into at least one chip, comprising:

a first chip area defined in a main surface of the wafer, the first chip area including structure related to a first photosite;

a groove defined in the wafer, the groove defining at least one edge of the first chip area; and

a light-transmissive planar layer disposed over the main surface, the planar layer forming a planar surface substantially parallel with the main surface, the planar layer extending over the groove.

31. (Amended) A method of making photosensitive chips for use in an imaging apparatus, comprising the steps of:

providing an integrated circuit wafer, the wafer comprising a first chip area defined in a main surface of the wafer, the first chip area including structure related to a first photosite, and a groove defined in the wafer, the groove defining at least one edge of the first chip area; [and]

providing a light-transmissive planar layer over the main surface, the planar layer forming a planar surface substantially parallel with the main surface, the planar layer extending over the groove; and

dicing the wafer along the groove to form a chip from the first chip area, a portion of the groove forming an edge of the chip, wherein a portion of the light-transmissive planar layer on the chip extends into the portion of the groove.

Claim 33 has been cancelled.